

WHAT IS CLAIMED IS:

1. A liquid crystal display device, comprising:

a first substrate, a second substrate, and a vertical alignment type liquid crystal layer provided between the first substrate and the second substrate; and

a plurality of picture element regions each defined by a first electrode provided on one side of the first substrate that is closer to the liquid crystal layer and a second electrode provided on the second substrate so as to oppose the first electrode via the liquid crystal layer, wherein:

the first substrate includes a first orientation-regulating structure in each of the plurality of picture element regions, the first orientation-regulating structure exerting an orientation-regulating force so as to form a plurality of liquid crystal domains in the liquid crystal layer, each of the liquid crystal domains taking a radially-inclined orientation in the presence of an applied voltage; and

the second substrate includes a second orientation-regulating structure in a region corresponding to at least one of the plurality of liquid crystal domains, the second orientation-regulating structure exerting an orientation-regulating force for orienting liquid crystal molecules in the at least one liquid crystal domain into a radially-inclined orientation at least in the presence of an applied

voltage.

2. The liquid crystal display device of claim 1, wherein the second orientation-regulating structure is provided in a region corresponding to a region in the vicinity of a center of the at least one liquid crystal domain.

3. The liquid crystal display device of claim 1, wherein in the at least one liquid crystal domain, a direction of orientation regulation by the second orientation-regulating structure coincides with a direction of the radially-inclined orientation by the first orientation-regulating structure.

4. The liquid crystal display device of claim 1, wherein the first electrode includes a plurality of unit solid portions, the first orientation-regulating structure including the plurality of unit solid portions, so that when a voltage is applied between the first electrode and the second electrode, an inclined electric field is produced along a periphery of each of the plurality of unit solid portions, thereby forming the plurality of liquid crystal domains in regions respectively corresponding to the plurality of unit solid portions.

5. The liquid crystal display device of claim 4, wherein a shape of each of the plurality of unit solid portions has rotational symmetry.

6. The liquid crystal display device of claim 5,

wherein each of the plurality of unit solid portions has a shape with an acute angle corner.

7. The liquid crystal display device of claim 4, wherein the second orientation-regulating structure is provided in a region corresponding to each of the plurality of liquid crystal domains.

8. The liquid crystal display device of claim 4, wherein the second orientation-regulating structure exerts an orientation-regulating force for orienting the liquid crystal molecules into a radially-inclined orientation even in the absence of an applied voltage.

9. The liquid crystal display device of claim 8, wherein the second orientation-regulating structure is a protrusion protruding from the second substrate into the liquid crystal layer.

10. The liquid crystal display device of claim 9, wherein a thickness of the liquid crystal layer is defined by the protrusion protruding from the second substrate into the liquid crystal layer.

11. The liquid crystal display device of claim 10, wherein the protrusion includes a side surface at an angle less than 90° with respect to a substrate plane of the second substrate.

12. The liquid crystal display device of claim 8, wherein the second orientation-regulating structure includes a surface having a horizontal alignment power provided on one

side of the second substrate that is closer to the liquid crystal layer.

13. The liquid crystal display device of claim 4, wherein the second orientation-regulating structure exerts an orientation-regulating force for orienting the liquid crystal molecules into a radially-inclined orientation only in the presence of an applied voltage.

14. The liquid crystal display device of claim 13, wherein the second orientation-regulating structure includes an opening provided in the second electrode.

15. The liquid crystal display device of claim 1, wherein:

the first electrode includes at least one opening and a solid portion; and

the first orientation-regulating structure includes the at least one opening and the solid portion of the first electrode, so that when a voltage is applied between the first electrode and the second electrode, an inclined electric field is produced at an edge portion of the at least one opening of the first electrode, thereby forming the plurality of liquid crystal domains in regions respectively corresponding to the at least one opening and the solid portion.

16. The liquid crystal display device of claim 15, wherein the first substrate further includes a dielectric layer provided on one side of the first electrode that is

away from the liquid crystal layer, and a third electrode opposing at least a portion of the at least one opening of the first electrode via the dielectric layer.

17. The liquid crystal display device of claim 15,
5 wherein the at least one opening includes a plurality of openings having substantially the same shape and substantially the same size, and at least some of the plurality of openings form at least one unit lattice arranged so as to have rotational symmetry.

10 18. The liquid crystal display device of claim 17, wherein a shape of each of the at least some of the plurality of openings has rotational symmetry.

15 19. The liquid crystal display device of claim 15, wherein the second orientation-regulating structure is provided in a region corresponding to each of the plurality of liquid crystal domains.

20 20. The liquid crystal display device of claim 15, wherein the second orientation-regulating structure is provided only in a region corresponding to one or more of the plurality of liquid crystal domains that is formed in a region corresponding to the solid portion of the first electrode.

25 21. The liquid crystal display device of claim 15, wherein the second orientation-regulating structure exerts an orientation-regulating force for orienting the liquid crystal molecules into a radially-inclined orientation even in the

absence of an applied voltage.

22. The liquid crystal display device of claim 21,
wherein the second orientation-regulating structure is a
protrusion protruding from the second substrate into the
5 liquid crystal layer.

23. The liquid crystal display device of claim 22,
wherein a thickness of the liquid crystal layer is defined by
the protrusion protruding from the second substrate into the
liquid crystal layer.

10 24. The liquid crystal display device of claim 23,
wherein the protrusion includes a side surface at an angle
less than 90° with respect to a substrate plane of the second
substrate.

15 25. The liquid crystal display device of claim 21,
wherein the second orientation-regulating structure includes
a surface having a horizontal alignment power provided on one
side of the second substrate that is closer to the liquid
crystal layer.

20 26. The liquid crystal display device of claim 15,
wherein the second orientation-regulating structure exerts an
orientation-regulating force for orienting the liquid crystal
molecules into a radially-inclined orientation only in the
presence of an applied voltage.

25 27. The liquid crystal display device of claim 26,
wherein the second orientation-regulating structure includes
an opening provided in the second electrode.

28. A liquid crystal display device, comprising:

a first substrate, a second substrate, and a vertical alignment type liquid crystal layer provided between the first substrate and the second substrate; and

5 a plurality of picture element regions each defined by a first electrode provided on one side of the first substrate that is closer to the liquid crystal layer and a second electrode provided on the second substrate so as to oppose the first electrode via the liquid crystal layer,
10 wherein:

the first electrode includes, in each of the plurality of picture element regions, a plurality of openings and a plurality of unit solid portions, each of the unit solid portions being surrounded by at least some of the
15 plurality of openings; and

the second substrate includes an orientation-regulating structure in a region corresponding to at least one unit solid portion among the plurality of unit solid portions and the plurality of openings.

20 29. The liquid crystal display device of claim 28, wherein a shape of each of the plurality of unit solid portions has rotational symmetry.

30. The liquid crystal display device of claim 28, wherein the orientation-regulating structure is a protrusion
25 protruding from the second substrate into the liquid crystal layer.

31. The liquid crystal display device of claim 30,
wherein a thickness of the liquid crystal layer is defined by
the protrusion protruding from the second substrate into the
liquid crystal layer.

5 32. The liquid crystal display device of claim 31,
wherein the protrusion includes a side surface at an angle
less than 90° with respect to a substrate plane of the second
substrate.

10 33. The liquid crystal display device of claim 28,
wherein the orientation-regulating structure includes a
surface having a horizontal alignment power provided on one
side of the second substrate that is closer to the liquid
crystal layer.

15 34. The liquid crystal display device of claim 28,
wherein the orientation-regulating structure includes an
opening provided in the second electrode.